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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/858,337	05/15/2001	William J. Schaff	1153.044US1	1100

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EXAMINER

DUONG, KHANH B

ART UNIT PAPER NUMBER

2822

DATE MAILED: 06/10/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/858,337

Applicant(s)

SCHAFF ET AL.

Examiner

Khanh Duong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 May 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 20-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☒ Interview Summary (PTO-413) Paper No(s). 4.
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to the filing of the application on May 15, 2001.

Accordingly, claims 1-30 are pending in the application.

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-19, drawn to a process of making a semiconductor device, classified in class 438, subclass 47.
- II. Claims 20-30, drawn to semiconductor device, classified in class 257, subclass 24.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the device can alternatively be made by forming the source and the drain after forming the AlN layer.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with Bradley Forrest on May 22, 2002, a provisional election was made *without* traverse to prosecute the invention of Group I, claims 1-19.

Affirmation of this election must be made by applicant in replying to this Office action. Claims 20-30 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

The disclosure is objected to because of the following informalities: page 2, line 8, ✓
“Si3N4” should have been --Si₃N₄--.

Appropriate correction is required.

Claim Objections

Claims 18 and 19 are objected to because of the following informalities: line 1, “claim 40” should have been --claim 17--. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international

application designating the United States was published under Article 21(2)(a) of such treaty in the English language;
or
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Grudkowski (U.S. 5,309,004).

Grudkowski discloses a method of forming a field effect transistor (see col. 5, lines 15-19) comprising the steps of: forming a channel heterojunction field effect transistor having an inherent top surface; and applying an AlN passivation film to the top surface of the heterojunction field effect transistor.

Claims 11 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Temkin et al. (U.S. 6,391,748).

Temkin et al. discloses a method of forming a layer of AlN using molecular beam epitaxy on a semiconductor substrate (see ABSTRACT) comprising the steps: applying a beam of Al; inherently delaying for a predetermined period; applying a beam of remote plasma RF nitrogen; inherently delaying for a predetermined period; and repeating application of the beams and delaying periods to produce the layer of AlN of desired thickness.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 12 and 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Temkin et al. (U.S. 6,391,748).

Re claims 12 and 14-19, Temkin et al. fails to show: forming the AlN layer to a thickness of approximately 500 Angstroms; alternately applying the beams at approximately less than 300°C for approximately two seconds; and delaying approximately two seconds between the alternating beams. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Temkin by selecting such thickness, temperature and times as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Temkin et al. (U.S. 6,391,748) in view of Grudkowski (U.S. 5,309,004).

Re claims 1 and 5, Temkin et al. fails to show applying the AlN layer to the top surface of a heterojunction field effect transistor. Grudkowski teaches to apply an AlN layer to the top surface of a heterojunction field effect transistor (see col. 5, lines 15-19). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the

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process of Temkin with the teaching of Grudkowski, since Grudkowski states that such modification would electrically passivate dangling bonds which would otherwise be present at the air-upper GaAs layer surface interface.

Re claims 2, 6, and 8-10, Temkin et al. fails to show: forming the AlN layer to a thickness between approximately 500 and 2000 Angstroms; alternately applying the beams at approximately 150°C for approximately two seconds; and delaying approximately two seconds between the alternating beams. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Temkin by selecting such thickness, temperature and times as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hooper et al. (U.S. '458), Yoshida (U.S. '099), Utumi et al. (U.S. '603) and Chyi (U.S. '146) disclose relevant methods of forming an AlN layer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Duong whose telephone number is (703) 305-1784. The examiner can normally be reached on Monday - Friday (9:00 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on (703)308-4940. The fax phone numbers for

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the organization where this application or proceeding is assigned are (703) 305-3431 for regular communications and (703)308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.


KBD
June 3, 2002


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800